Roll No. .....

Total Pages : 3

239412

May, 2019

M.Sc. IV SEMESTER

Physical Chemistry (Special IV) CH-424A

Time : 3 Hours]

[Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART–A

1. (a) What is impact parameter? How it is related with rate constant? (1.5)

(b) What is Shock tube technique? (1.5)

(c) Define Critical Micelle Concentration. Show its variation with molar conductance. (1.5)

(d) What are Onsager Phenomenological Coefficients? (1.5)

(e) Explain Solubilization. (1.5)

(f) Write down the shortcoming of Hinshelwood theory. (1.5)

(g) What is Kraft temperature? (1.5)

(h) Elaborate the term RRKM. (1.5)

(i) Differentiate the single step and multiple step electrode reactions. (1.5)

(j) What is chronopotentiometery? (1.5)

PART–B

2. (a) Discuss the activated complex theory (ACT) of bimolecular mixtures. How this theory helps in evaluating the enthalpy and entropy of activation? (10)

(b) Briefly explain the RRK theory of unimolecular reactions. (5)

3. (a) Illustrate the influence of the ionic strength and the nature of the solvents on the rates of the ionic reactions. (5)

(b) (i) Derive the expression for the rate constant of the fast reactions. (5)

(ii) Explain lineweaner-Burk plot for the analysis of Enzymolysis. (5)

4. (i) Derive the Butler-Volmer equation in the kinetics of electrode reactions. (8)

(ii) What are Tafel equations? (4)

(iii) What is diffusion overpotential? (3)

5. (a) How is CMC is related to free energy change, enthalpy change and entropy change accompanying the process of micelle formation? (5)

(b) (i) Explain the micellar catalysis from enzyme catalysis. (5)

(ii) Explain the factors affecting CMC. (5)

6. (a) Discuss the system in stationary non equilibrium states leading to Prigogine's principle of minimum entropy production. (5)

(b) (i) Describe the stopped flow method, pulse method and flash photolysis for studying the kinetics of fast reactions. (5)

(ii) Explain Amperometric titrations. (5)

7. (i) Derive the Onsagar reciprocal relations from the principle of microscopic reversibility. (8)

(ii) Derive an expression for entropy production due to heat flow in closed systems. (7)